PTO/SB/30 (11-04)
Approved for use through 07/31/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

OIPE JC13 JUL 18 2005 U.S. PATENT & TRADEMARK OFFICE

PETITION FEE
Under 37 CFR 1.17(f), (g) & (h)
TRANSMITTAL
(Fees are subject to annual revision)

Send completed form to: Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

Application Number	**10/777,107**
Filing Date	**February 13, 2004**
First Named Inventor	**Y. EGUCHI**
Art Unit	**2181**
Examiner Name	**Unassigned**
Attorney Docket Number	**NIT-411**

Enclosed is a petition filed under 37 CFR 1.102(d) that requires a processing fee (37 CFR 1.17(f), (g), or (h)).
Payment of $ 130.00 is enclosed.
This form should be included with the above-mentioned petition and faxed or mailed to the Office using the appropriate Mail Stop (e.g., Mail Stop Petition), if applicable. For transmittal of processing fees under 37 CFR 1.17(i), see form PTO/SB/17i.

Payment of Fees (small entity amounts are NOT available for the petition (fees)

☒ The Commissioner is hereby authorized to charge the following fees to Deposit Account No. 50-1417:
☐ petition fee under 37 CFR 1.17(f), (g) or (h) ☒ any deficiency of fees and credit of any overpayments
Enclose a duplicative copy of this form for fee processing.

☐ Check in the amount of $ _____ is enclosed.

☒ Payment by credit card (From PTO-2038 or equivalent enclosed). Do not provide credit card information on this form.

Petition Fees under 37 CFR 1.17(f): Fee $400 Fee Code 1462
For petitions filed under:
§ 1.53(e) - to accord a filing date.
§ 1.57(a) - to according a filing date.
§ 1.182 – for decision on a question not specifically provided for.
§ 1.183 – to suspend the rules.
§ 1.378(e) for reconsideration of decision on petition refusing to accept delayed payment of maintenance fee in an expired patent.
§ 1.741(b) – to accord a filing date to an application under §1.740 for extension of a patent term.

Petition Fees under 37 CFR 1.17(g): Fee $200 Fee code 1463
For petitions filed under:
§1.12 - for access to an assignment record.
§1.14 - for access to an application.
§1.47 - for filing by other than all the inventors or a person not the inventor.
§1.59 - for expungement of information.
§1.103(a) - to suspend action in an application.
§1.136(b) - for review of a request for extension of time when the provisions of section 1.136(a) are not available.
§1.295 - for review of refusal to publish a statutory invention registration.
§1.296 - to withdraw a request for publication of a statutory invention registration filed on or after the date the notice of intent to publish issued.
§1.377 – for review of decision refusing to accept and record payment of a maintenance fee filed prior to expiration of a patent.
§1.550(c) – for patent owner requests for extension of time in ex parte reexamination proceedings.
§1.956 – for patent owner requests for extension of time in inter partes reexamination proceedings.
§ 5.12 – for expedited handling of a foreign filing license.
§ 5.15 – for changing the scope of a license.
§ 5.25 – for retroactive license.

Petition Fees under 37 CFR 1.17(h): Fee $130 Fee Code 1464
For petitions filed under:
§1.19(g) – to request documents in a form other than that provided in this part.
§1.84 – for accepting color drawings or photographs.
§1.91 – for entry of a model or exhibit.
§1.102(d) – to make an application special.
§1.138(c) – to expressly abandon an application to avoid publication.
§1.313 – to withdraw an application from issue.
§1.314 – to defer issuance of a patent.

Name (Print/Type)	**Colin D. Barnitz**	*Registration No. (Attorney/Agent)*	**35,061**
Signature	Colin D Barnitz	*Date*	July 18, 2005

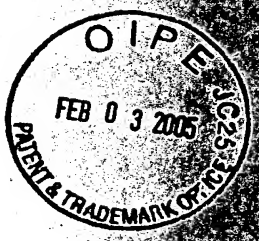
This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.
1800 Diagonal Road, Suite 370
Alexandria, Virginia 22314
(703) 684-1120

NIT-411

Appl. No.		**10/777,107**
Inventor	:	EGUCHI, Y. et al.
Filed	:	February 13, 2004
Title	:	STORAGE SUBSYSTEM
Group Art Unit:		2181
Examiner	:	Unassigned
Docket No.	:	NIT-411
Customer No.		24956

Confirmation No. 4558



Papers Filed Herewith:

Fee Transmitta;
PETITION TO MAKE SPECIAL ; and
Credit Card Payment Form in the amount of $130.00
in payment of petition to make special fee.

Receipt is hereby acknowledged of the papers filed, as identified in connection with the above-identified patent application.

COMMISSIONER FOR PATENTS

OIPE JC73 JUL 18 2005 PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	**10/777,107**	Confirmation No. 4558
Inventor	:	EGUCHI, Y. et al.	
Filed	:	February 13, 2004	
Title	:	STORAGE SUBSYSTEM	
TC/AU	:	2181	
Examiner	:	Unassigned	
Docket No.	:	NIT-411	
Customer No.:		24956	

MAIL STOP PETITIONS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESUBMISSION
OF
PETITION TO MAKE SPECIAL
(ACCELERATED EXAMINATION UNDER 37 CFR §1.102(d))

Sir:

On February 3, 2005, the Applicants filed a Petition to Make Special for Accelerated Examination in accordance with 37 CFR §1.102(d) and MPEP § 708.02(VIII). However, to-date, no decision on the Petition has been issued. Accordingly, Applicants are resubmitting the Petition. Further, Applicants have modified their discussion of the references in this Resubmission to better distinguish the claims of the application from the cited references.

07/20/2005 MBEYENE1 00000052 501417 10777107
01 FC:1464 130.00 DA

PETITION TO MAKE SPECIAL

The Applicants petition the Commissioner to make the above-identified application special in accordance with 37 CFR §1.102(d). In support of this Petition, pursuant to MPEP § 708.02(VIII), Applicants state the following.

(A) REQUIRED FEE

This Petition when originally filed was accompanied by the fee set forth in 37 CFR § 1.117(h). The Commissioner is hereby authorized to charge any additional payment due, or to credit any overpayment, to Deposit Account No. 50-1417.

(B) ALL CLAIMS ARE DIRECTED TO A SINGLE INVENTION

All the pending claims of the application, claims 1-20, are directed to a single invention. If the Office determines that all claims in the application are not directed to a single invention, Applicant will make election without traverse as a prerequisite to the grant of special status in conformity with established telephone restriction practice.

The present invention, as set forth in independent claims 1, 7, 12, 18 and 20, is generally directed to a storage system that stores a copy of data to be transmitted from the first storage system. Under independent claim 1, the invention is a data restoring method for restoring data stored in a second storage system in a storage subsystem including a first storage system and a second storage system, each of which is connected to a host via a communication channel, in which the second

storage system stores a copy of data to be transmitted from the first storage system, wherein the first storage system processes an I/O request from the host, and as a result of I/O processing of the second storage system, transmits updated data, the second storage system retains data received from the first storage system as update log data, and the host transmits a command for settling a state of an application to the first storage system as data, the first storage system transmits the data to the second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system.

Furthermore, under independent claim 7, the invention is a data processing method for processing data to be stored in a storage unit in a computer system including a storage system equipped with the storage unit connected to a host through a network, wherein the host comprises the steps of: requesting the storage system to create and save a copy of data which has been stored in the storage unit; requesting the storage system to record an update portion of data due to processing of the host; and transmitting to the storage system identification information for identifying a state of the computer system at any given time, and the storage system comprises the steps of: creating and saving a copy of data of the storage unit in response to a request of the host; saving, when content of the storage unit has been updated, data prior to and subsequent to the update and information indicating a

place of update as log data; retaining identification information to be transmitted from the host; and relating the log data to the identification information.

Additionally, under independent claim 12, the invention is a storage subsystem including a first storage system and a second storage system, each of which is connected to a host via a communication channel, for storing, in the second storage system, a copy of data stored in the first storage system, the first storage system comprising: a storage unit having a plurality of logical storage units; a cache memory for temporarily storing data to be inputted into or outputted from the storage unit; a memory for storing at least management information concerning the logical storage unit, management information for defining a configuration of pair duplex between the first storage system and the second storage system and a program for processing a command from the host; and a processor for executing the program; the second storage system comprising: a plurality of logical storage units, of which a certain logical storage unit stores a copy of data to be stored in a logical storage unit of the first storage system constituting a pair, and another logical storage unit comprises: a storage unit to be allocated in order to store log data generated by the first storage system; a cache memory for temporarily storing data to be inputted into or outputted from the storage unit; a memory for storing at least management information concerning the logical storage unit, management information for defining a configuration of pair duplex between the first storage system and the second storage system, management information of a log and a program for processing a command from the host; and a processor for executing the program, wherein when

content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory.

Furthermore, under independent claim 18, the invention is a storage system for storing, in a second storage system, a copy of data to be stored in a first storage system to be connected to a host via a communication channel, having: a plurality of logical storage units, of which a certain logical storage unit stores a copy of data to be stored in a logical storage unit of the first storage system constituting a pair, and another logical storage unit comprises: a storage unit to be allocated in order to store log data generated by the first storage system; a cache memory for temporarily storing data to be inputted into or outputted from the storage unit; a memory for storing at least management information concerning the logical storage unit, management information for defining a configuration of pair duplex between the first storage system and the second storage system, management information of a log and a program for processing a command from the host; and a processor for executing the program, wherein when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing

identification information transmitted from the host into correspondence with the log data is stored in the memory.

Finally, under independent claim 20, the invention is a storage subsystem including a first storage system and a second storage system, each of which is connected to a host via a communication channel, for storing, in the second storage system, a copy of data stored in the first storage system, the first storage system comprising: a storage unit having a plurality of logical storage units; a cache memory for temporarily storing data to be inputted into or outputted from the storage unit; a memory for storing at least management information concerning the logical storage unit, management information for defining a configuration of pair duplex between the first storage system and the second storage system and a program for processing a command from the host; and a processor for executing the program, wherein the command processing program processes a command to be transmitted from the host, and when the command is a mark command, creates log data and performs processing for imparting identification information, and in the case of an I/O processing command, the command processing program determines a hit or a miss-hit of the cache memory, writes write data in the cache memory, or reads out read data from the cache memory, the second storage system comprising: a plurality of logical storage units, of which a certain logical storage unit stores a copy of data to be stored in a logical storage unit of the first storage system constituting a pair, and another logical storage unit comprises: a storage unit to be allocated in order to store log data generated by the first storage system; a cache memory for temporarily

storing data to be inputted into or outputted from the storage unit; a memory for storing at least management information concerning the logical storage unit, management information for defining a configuration of pair duplex between the first storage system and the second storage system, management information of a log and a program for processing a command from the host; and a processor for executing the program, wherein when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory, on receipt of an acquisition commencement command of log data and a command for suspending the pair duplex of the storage unit from the host, the first storage system confirms a storage unit located in the second storage system which is in the pair duplex to suspend the pair duplex, when the log data stored in the logical storage unit in the second storage system is restored to a state at any given time, the second storage system receives a request for restoring data transmitted from the host, and restores the log data stored in the logical storage unit by referring to the management information stored in the memory concerning the identification information.

(C) PRE-EXAMINATION SEARCH

A pre-examination search has been conducted, directed to the invention as claimed. The pre-examination search was conducted in the following US Manual of Classification areas:

Class	Subclass
707	202, 204
711	114, 162
714	6, 20

Furthermore, a keyword search was conducted on the USPTO's EAST database. Additionally, a literature search was also conducted for relevant non-patent documents using DIALOG online databases. In addition, a search for foreign patent documents was conducted on the ESPACENET databases.

(D) REFERENCES DEEMED MOST-CLOSELY RELATED TO THE SUBJECT MATTER ENCOMPASSED BY THE CLAIMS

Based upon a review of the documents located by the search and the documents already of record in the application, the references deemed to be most-closely related to the subject matter encompassed by the claims are listed below. These documents were made of record in the present application by the Information Disclosure Statements filed December 15, 2004, and February 13, 2004.

Document No.	Inventor
US 6044444	Ofek, Yuval
US 6393537	Kern, Robert F. et al.
US 6397229	Menon, Jaishankar M. et al.
US 6606694	Carteau, Daniel
US 6671705	Duprey, Dennis et al.
US 6732123	Moore, David Wayne et al.
US 6789178	Mikkelsen, Claus W. et al.

Document No.	Inventor
US 20030145179	Gabber, Eran et al.
US 5263154	Eastridge, Lawrence E. et al.
US 5544347	Yanai, Moshe et al.
US 5742792	Yanai, Moshe et al.
JP2001-216185	Watanabe, Haruaki et al.

Because all of the above-listed documents are already of record in the present application, in accordance with MPEP § 708.02(VIII)(D), additional copies of these documents have not been submitted with this Petition.

(E) DETAILED DISCUSSION OF THE REFERENCES

Following a brief discussion of the invention, the references deemed most-closely related are discussed below in Section (E)2, pointing out, with the particularity required by 37 CFR 1.111 (b) and (c), how the claimed subject matter is patentable over the teachings of these documents.

1. Discussion of the Invention

As set forth in claim 1, a first feature of the invention includes that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system.

Further, as set forth in claim 7, a second feature of the invention includes the storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information.

Additionally, as set forth in claims 12, 18, and 20, a third feature of the invention includes that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory.

As will be discussed in more detail below, the prior art does not teach or suggest the above-described features.

2. Discussion of the References Deemed to be Most-Closely Related

US Patent No. 6044444, to Ofek, discloses two data storage systems interconnected for remote mirroring of data. A number of automatic and non-automatic recovery mechanisms are provided. One option, when performing automatic recovery, is to log multiple versions of tracks containing remote pending data. Other recovery methods include a scheme in which an application program

maintains a log file of all writes. To ensure recovery, the application program always writes data to a primary copy of the log file before it is written to a primary copy of the data file. The degree of synchronization between the secondary copies and the primary copies is maintained so that the remote mirroring facility always writes data to the secondary copy of the log file prior to writing data to the secondary copy of the data file. Ofek also includes a log-in-cache mode in which multiple versions of write data can be stored in cache in order to recover from a rolling disaster. (See, e.g., column 4, lines 15-22 and lines 35-52, and Abstract.) Thus, while Ofek teaches the storage of log data, Ofek does not teach the present invention, including relating identifier information to log data. More particularly, Ofek does not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system as set forth in claim 1. Similarly, Ofek does not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information, as set forth in claim 7. Further, Ofek does not teach that when content of a certain

logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

US Patent No. 6393537, to Kern et al., discloses an outboard data management device that manages the movement of data to and from various data storage devices, while only sending data to the host processor if necessary. Thus, the primary processor is free to perform other tasks. (See, e.g., column 5, line 60, through column 6, line 36.) However, Kern et al. do not teach the present invention, including the relation, in a storage system, of log data to identification information. More particularly, Kern et al. do not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system as set forth in claim 1. Similarly, Kern et al. do not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to

and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information, as set forth in claim 7. Further, Kern et al. do not teach that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

US Patent No. 6397229, to Menon et al., discloses a system having an outboard storage-controller-managed incremental backup/restore of data. A value of an indicator residing in the memory of a storage controller is set when the associated portion of the data has changed. The associated portion of the data stored in the data storage device is backed up using the storage controller when the value of the indicator residing in the memory is set. The value of the indicator is cleared once the associated data has been backed up. Thus, the overhead on the host computer is reduced. (See, e.g., column 1, line 63, through column 2, line 15; and column 5, line 15, through column 6, line 14.) Accordingly, Menon et al. do not teach relating log data in a storage system to identification information. More particularly, Menon et al. does not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a

second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system as set forth in claim 1. Similarly, Menon et al. does not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information, as set forth in claim 7. Further, Menon et al. does not teach that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

US Patent No. 6606694, to, discloses a system in which disk drives are mirrored through duplication controlled by disk controllers. Each disk controller controls writing to a set of disk drives. The first controller logs writes to a second controller in a log file to enable resynchronization after mirroring is broken and reestablished. (See, e.g., column 4, lines 28-40.) However, Carteau fails to teach

relating log data in a storage system to identification information. More particularly, Carteau does not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system as set forth in claim 1. Similarly, Carteau does not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information, as set forth in claim 7. Further, Carteau does not teach that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

US Patent No. 6671705, to Duprey et al., discloses a remote mirroring system in which a master storage unit uses a log to resynchronize slave images following a

fail in the master storage unit. The log is preserved through the failure and is available to the master storage unit upon recovery from the failure. (See, e.g., column 2, line 66, through column 3, line 19; and column 4, line 27, through column 5, line 49.) Thus, Duprey et al. do not teach that the log data is related to identification information, as recited in the claims of the present application. More particularly, Duprey et al. do not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system as set forth in claim 1. Similarly, Duprey et al. do not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information, as set forth in claim 7. Further, Duprey et al. do not teach that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing

identification information transmitted from the host into correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

US Patent No. 6732123, to Moore et al., discloses a method and apparatus for merging of log data for recovering one or more database data sets in a single pass of the respective log data. This eliminates the need for change accumulation, and the need to run separate recovery jobs for each data set requiring recovery. Recovery may be in accordance with a supplied time-stamp by means of point-in-time recovery. (See, e.g., column 7, line 7, through column 8, line 53.) However, Moore et al. do not teach that the log data is related to identification information, as recited in the claims of the present application. More particularly, Moore et al. do not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system as set forth in claim 1. Similarly, Moore et al. do not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to

the identification information, as set forth in claim 7. Further, Moore et al. do not teach that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

US Patent No. 6789178, to Mikkelsen et al., discloses a system in which, when a remote copy is suspended, a primary controller stops sending update information to the secondary controller, and begins storing indicators of the updated information in cache memory. When the primary controller resumes remote copy operation, it uses the cached indicators to identify update information the must be sent to the secondary controller to resynchronize remote copy. (See, e.g., Abstract and column 4, line 55, through column 5, line 50.) Thus, Mikkelsen et al. do not teach that log data in a storage is related to identification information, as recited in the claims of the present application. More particularly, Mikkelsen et al. do not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given

time by the second storage system as set forth in claim 1. Similarly, Mikkelsen et al. do not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information, as set forth in claim 7. Further, Mikkelsen et al. do not teach that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

Published US Patent Application No. US 20030145179, to Gabber et al., discloses a method and apparatus for replicated storage in which recovery is effected directly between respective storage elements and associated storage devices without transmitting the data through a host. The host assigns consecutive sequence numbers to consecutive write requests. The storage element and its associated storage device are determined not to have up-to-date data when it fails to receive one or more recent write requests, or when a gap is detected in sequence numbers. (See, e.g., paragraphs 7-8 and 20-24.) Thus, Gabber et al. do not teach

that the log data is related to identification information, as recited in the claims of the present application. More particularly, Gabber et al. do not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system as set forth in claim 1. Similarly, Gabber et al. do not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information, as set forth in claim 7. Further, Gabber et al. do not teach that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

US Patent No. 5263154, to Eastridge et al., shows a conventional technique concerning backup and restoration, in which data stored in the storage system at a point of time designated by the user is reproduced on a magnetic tape without stopping input and output of data from a host connected to the storage system, and through the use of the data thus reproduced, the data is recovered. In the restoration processing described by Eastridge et al., when reading out backup data from a magnetic tape, a portion which has not been updated from a point of time when the backup data has been acquired, is also read out from the magnetic tape, and is written into the storage system. (See, e.g., Abstract and column 3, lines 23-45.) Thus Eastridge et al. do not teach that the log data is related to identification information, as recited in the claims of the present application. More particularly, Eastridge et al. do not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system as set forth in claim 1. Similarly, Eastridge et al. do not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log

data to the identification information, as set forth in claim 7. Further, Eastridge et al. do not teach that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

US Patent Nos. 5544347 and 5742792, to Yanai et al., disclose a technique for copying data by a remote storage system independently of the host. Under the teachings of Yanai et al., data written by a host to a primary volume is automatically sent over a link to corresponding secondary volume. When remote mirroring fails, the secondary copy of the data can be recovered using changes recorded in the secondary copy of the log file. (See, e.g., Abstract and column 4, line 64, through column 5, line 15 of the '792 patent.) However, Yanai et al. do not teach that the log data is related to identification information, as recited in the claims of the present application. More particularly, Yanai et al. do not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage

system as set forth in claim 1. Similarly, Yanai et al. do not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information, as set forth in claim 7. Further, Yanai et al. do not teach that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

JP2001-216185 (equivalent to US6658434), to Watanabe et al., teaches a system and method for recovering data in which information regarding a place where the data has been updated is retained as difference information after backup of the data is carried out, and when data stored in the storage system is restored with the backup data, only a portion of the backup data shown by the difference information is used to restore the data. As regards data which has been updated during a period of time from a time at which backup of data is carried out to a time at which the storage system develops a failure, however, the data cannot be restored. When an attempt

is made to restore data which has been updated after backup of data is carried out, it is necessary for the host side to manage the content of update of the data, by a log or the like, thus placing a load on the host. (See, e.g., Abstract and column 2, lines 1-33 of the '434 patent.) Thus, Watanabe does not teach that the log data is related to identification information, as recited in the claims of the present application. More particularly, Watanabe et al. do not teach that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system as set forth in claim 1. Similarly, Watanabe et al. do not teach a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information, as set forth in claim 7. Further, Watanabe et al. do not teach that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into

correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

(F) CONCLUSION

As demonstrated by the above discussion, the references fail to teach or suggest that a host transmits a command for settling a state of an application to a first storage system as data, the first storage system transmits the data to a second storage system, and the host and the second storage system both retain an identifier corresponding to the command, and relate the identifier to the log data whereby the host designates the identifier at any given time to thereby restore data at any given time by the second storage system as set forth in claim 1.

Similarly, the references fail to teach or suggest a storage system creating and saving a copy of data of a storage unit in response to a request of the host, and saves as log data, when content of the storage unit has been updated, data prior to and subsequent to the update, and information indicating a place of update, so that the storage system retains identification information to be transmitted from the host, and relates the log data to the identification information, as set forth in claim 7.

Further, the references fail to teach or suggest that when content of a certain logical storage unit of the first storage system has been updated, the data thus updated and information indicating a place of update are transmitted to the second storage system as log data and stored in the logical storage unit, and management information for bringing identification information transmitted from the host into

correspondence with the log data is stored in the memory, as set forth in independent claims 12, 18, and 20.

Thus, it is submitted that all of these claims are patentable over the cited references taken individually, or in combination with each other. The remaining claims are dependent claims, claim additional features of the invention, and are patentable at least because they depend from allowable base claims. Accordingly, the requirements of 37 CFR §1.102(d) having been satisfied, the Applicants request that this Petition to Make Special be granted and that the application be examined according to prescribed procedures set forth in MPEP §708.02 (VIII).

The Applicants prepared this Petition in order to satisfy the requirements of 37 C.F.R. §1.102(d) and MPEP §708.02 (VIII). The pre-examination search required by these sections was "directed to the invention as claimed in the application for which special status is requested." MPEP §708.02 (VIII). The search performed in support of this Petition is believed to be in full compliance with the requirements of MPEP §708.02 (VIII); however, Applicants make no representation that the search covered every conceivable search area that might contain relevant prior art. It is always possible that prior art of greater relevance to the claims may exist. The Applicants urge the Examiner to conduct his or her own complete search of the prior art, and to thoroughly examine this application in view of the prior art cited above and any other prior art that may be located by the Examiner's independent search.

Further, while the Applicants have identified and discussed certain portions of each cited reference in order to satisfy the requirement for a "detailed discussion of

the references, which discussion points out, with the particularly required by 37 C.F.R. §1.111(b) and (c), how the claimed subject matter is patentable over the references" (MPEP §708.02(VIII)), the Examiner should not limit review of these documents to the identified portions, but rather is urged to review and consider the entirety of each reference.

(G) FEE PAYMENT (37 C.F.R. 1.17(h))

The fee required by 37 C.F.R. § 1.17(h) is to be paid by:

[ ] the Credit Card Payment Form (attached) for $130.00.

[ ] charging Account 50-1417 the sum of $130.00.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417. A duplicate of this petition is attached.

Respectfully submitted,

Colin D. Barnitz
Registration No. 35,061

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.
1800 Diagonal Rd., Suite 370
Alexandria, Virginia 22314
703-684-1120
Date: July 18, 2005